

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the comments which follow.

As correctly noted in the Office Action Summary, claims 1-10 and 12-16 were pending. The claims have not been amended by the present response. Thus, upon entry of the present response, claims 1-10 and 12-16 remain pending and await further consideration on the merits.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-10 and 12-16 stand rejected under 35 U.S.C. §103(a) as being obvious over WO 0154971 A1 to Varis (hereafter "*Varis*") in view of NO 10907 and GB 9792 (NO 10907 and GB 9792 collectively referred to herein as "*Parsons*") and further in view of CA 245576 to Akimoff (hereafter "*Akimoff*") on the grounds set forth in paragraph 7 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counter rotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification). This form of cavitation is sometimes referred to as "sheet cavitation." An

arrangement constructed according to the present invention minimizes the harmful effects associated with hub vortex cavitation by arranging a well-streamlined hub after the forward propeller with flow plates being disposed on the hub (see, e.g., page 4, lines 17-20). An arrangement constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

1. Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, the cap on the forward propeller having a length wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller and that the flow plates are radially projecting from the cap, the flow plates on the whole length of the forward cap and link up to each other and extend beyond an aft facing end of the cap.

According to a further aspect, an arrangement formed according to the principles of the present invention is set forth in amended claim 12. Amended claim 12 recites:

*12. An arrangement comprising:
a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and
a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap having a length and comprising a plurality of equally spaced flow plates projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;
wherein the aft propeller and the forward propeller have opposite directions of rotation;
wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and
wherein the flow plates are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow*

plates on the whole length of the second cap and link up to each other and extend beyond an aft facing end of the cap.

Neither *Varis*, *Parsons* nor *Akimoff*, alone or in combination, disclose or suggest the arrangements defined in claims 1 and 12.

Varis, which is commonly owned with the present application and referenced in the background section of this case, is directed to a counter rotating propeller-type propulsion system. However, as admitted in a grounds for rejection, *Varis* fails to disclose, or even suggest, a propeller hub having a cap with at least two (a plurality) equally distributed flow plates arranged thereon.

Parsons is directed to a single propeller-type propulsion system. It is alleged that *Parsons* discloses a cone with flow plates disposed thereon to help reduce "cavitation effects." However, as admitted in a grounds for rejection, *Parsons* fails to disclose flow plates that either extend the entire length of the cap or extend beyond the aft end thereof, as required by claims 1 and 12.

In addition, it is important to recognize that, in contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons* is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons*. Thus, for example, the disclosure of *Parsons* is of minimal relevance to one of ordinary skill in the art seeking to minimize the effects of the aforementioned "sheet cavitation" as well as the interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the

teachings of *Parsons* as being particularly relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms. In other words, it would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons*.

Since *Parsons* involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of *Parsons* as to whether one should modify the forward or aft propeller arrangement of a CRP system such as that described by *Varis*, much less how to go about modifying them.

Moreover, claim 12 requires that the flow plates are constructed and arranged to eliminate cavitation in a separation zone defined between opposing first and second caps of a CRP arrangement. *Parsons* contains no disclosure or teaching concerning addressing cavitation in such a separation zone, which as explained above, presents different hydrodynamic conditions than a propulsion system of the type described by *Parsons* which lacks counter rotating propellers.

It is asserted on page 4 of the Official Action that *Akimoff* discloses flow plates that extend along substantially the entire length of the cap and link up to each other and extend beyond an aft-facing end of a propeller hub cap.

However, *Akimoff* teaches that the alleged "flow plates" exceed the outer diameter of the cap order to provide the alleged increase in propeller efficiency and reduction in activity of the central vortex:

. . . light ribs 17 are provided on the outside of the appendage 13, which, under certain conditions, for instance, low speed, will yield more effect in the producing of an increased activity of the central vortex. (Emphasis added; page 4, last paragraph)

By contrast, claim 12 requires that the flow plates do not extend beyond the diameter of the cap. Thus, *Akimoff* teaches away from at least this requirement of the presently claimed invention.

Akimoff, like *Parsons*, is directed to a single propeller arrangement opposing a rudder. *Akimoff* also provides no guidance with respect to whether one should modify a forward or aft propeller of a CRP system such as that described by *Varis*, or how the complex cavitation mechanisms of a CRP system could be adequately addressed.

In the Declaration Pursuant to 37 C.F.R. §1.132 filed December 8, 2008, evidence was proffered with respect to why one of ordinary skill in the art would have been led away from the proposed modification, involving increasing the surface area of the fins of *Parsons*, for the reason that increasing the surface area of the fins results in increased friction as the propeller rotates through the water. This increased friction increases the load on the propeller, thereby slowing the rotation thereof absent the application of additional power to rotate the propeller. Therefore, increasing the surface area of the fins possesses at least the disadvantage of decreased efficiency of the power train of the vessel. Therefore, applicants respectfully submit that it would not necessarily have been obvious to one of ordinary skill in the art to undertake the proposed modification of the fins of *Parsons* in view of *Akimoff*.

It is noted that on page 6, in paragraph 6 of the previous Official Action, it was asserted that the Declaration filed December 8, 2008 is insufficient to overcome the rejection of the previously presented claims 1-14 "because the prior art references cited in combination are considered to disclose the claimed features of Applicants'

invention." However, such commentary does not address the evidence presented. Declaration evidence and arguments have been presented providing reasons why the proposed combination would not have been made in the first place, and would not render the claimed invention obvious. In the current Official Action, the only mention of the Declaration evidence of record appears on page 6, paragraph 9 of the Official Action. ". . . the Examiner disagrees for the reasons presented in the previous Office Action as well as for the reasons provided above in this Office Action." However, the substance of the Declaration evidence remains summarily dismissed, without an adequate discussion as to why the evidence is deficient. Failure to adequately consider rebuttal arguments and evidence presented by applicants constitutes reversible error. See, e.g., *In re Soni*, 54 F.3d 746, 750, 34 USPQ2d 1684, 1687 (Fed. Cir. 1995).

It is noted that the grounds for rejection contained numerous conclusory assertions that certain aspects of the presently claimed invention would have been obvious as "a matter of design choice" or "as a matter of engineering design choice." For example, it is alleged on pages 5-6 of the Official Action that: "the diameter, number, position and method of attaching the flow plates, would all be considered obvious to one of ordinary skill in the art to which the subject matter pertains as a matter of engineering design choice" Reliance upon such rationale, when the "design choice" is not related to aesthetics, is dubious at best. In particular, controlling authority tends to discredit such "design choice" rationale. *In re Gal*, 980 F.2d 717, 25 USPQ2d 1076 (Fed. Cir. 1992) (finding of "obvious design choice" precluded where the claim structure and the function of it performed are different from the prior art); *In re Chu*, 66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995).

Should the grounds for rejection be maintained, applicants respectfully request that statutory or common law authority be cited supporting "engineering design choice" as an appropriate rationale in support of the determination of a *prima facie* case of obviousness.

For at least the reasons noted above, it would not have been obvious to have combined the teachings of *Varis*, *Parsons* and *Akimoff* in a manner such that the arrangements of claims 1 and 12 of the presently claimed invention would be produced, contrary to the assertions contained in the grounds for rejection.

The remaining claims depend from either claim 1 or 12. Thus, these claims are also distinguishable over the proposed 3-reference combination for at least the same reasons noted above.

CONCLUSION

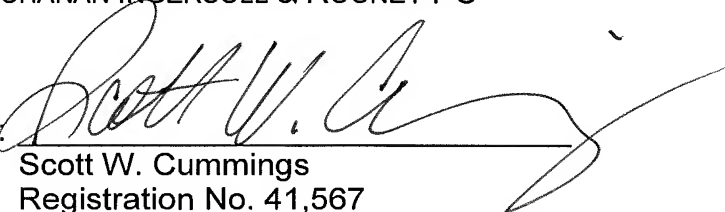
From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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